

(19) World Intellectual Property
Organization
International Bureau



(43) International Publication Date
29 December 2004 (29.12.2004)

PCT

(10) International Publication Number
WO 2004/113880 A3

(51) International Patent Classification⁷: **G01N 21/55**
(21) International Application Number:
PCT/JP2004/009239

(22) International Filing Date: 23 June 2004 (23.06.2004)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
2003-177911 23 June 2003 (23.06.2003) JP

(71) Applicant (for all designated States except US): **CANON KABUSHIKI KAISHA** [JP/JP]; 30-2, Shimomaruko 3-chome, Ohta-ku, Tokyo 146-8501 (JP).

(72) Inventors; and

(75) Inventors/Applicants (for US only): **KURODA, Ryo** [JP/JP]; 6-29-3-806, Nakanoshima, Tama-ku, Kawasaki-shi, Kanagawa 214-0012 (JP). **YAMADA, Tomohiro**, [JP/JP]; 1-18-21-201, Kamitsurumahoncho,, Sagamihara-shi, Kanagawa 228-0818 (JP).

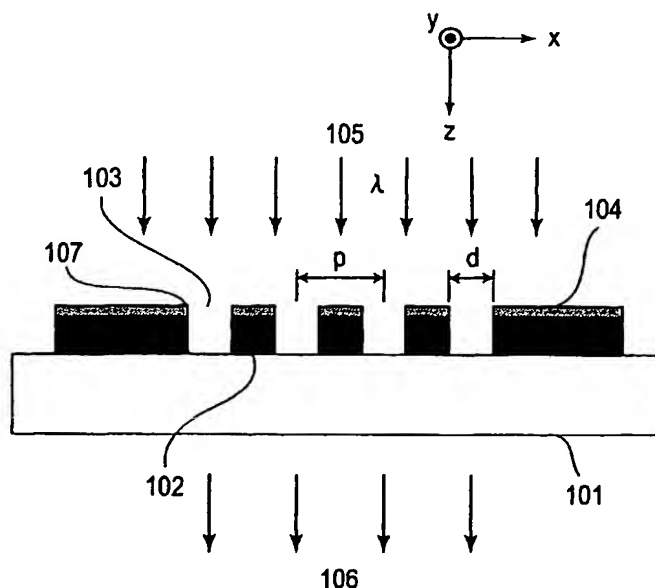
(74) Agent: **YAMADA, Ryuichi**; Toko International Patent Office, Hasegawa Bldg. 4F, 7-7, Toranomon 3-chome, Minato-ku, Tokyo 105-0001 (JP).

(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

[Continued on next page]

(54) Title: **CHEMICAL SENSOR AND CHEMICAL SENSOR APPARATUS**



(57) Abstract: A chemical sensor for detecting a reaction of a sensor material with a specimen on the basis of an intensity of a surface plasmon polariton wave propagated along a surface of a sensor medium including the sensor material is principally constituted by the sensor medium. The sensor medium includes a periodic structure and the sensor material disposed on the periodic structure. The periodic structure has a pitch substantially equal to an integral multiple of a wavelength of the surface plasma polariton wave generated by irradiating an interface between the periodic structure and the sensor material with light.



Published:

— *with international search report*

(88) Date of publication of the international search report:
12 May 2005

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

INTERNATIONAL SEARCH REPORT

JP2004/009239

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 G01N21/55

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHEDMinimum documentation searched (classification system followed by classification symbols)
IPC 7 G01N

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the International search (name of data base and, where practical, search terms used)

EPO-Internal, PAJ, INSPEC, COMPENDEX

C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category * | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|------------|--|-----------------------|
| X | PATENT ABSTRACTS OF JAPAN vol. 2003, no. 04, 2 April 2003 (2003-04-02) & JP 2002 357543 A (MITSUBISHI CHEMICALS CORP), 13 December 2002 (2002-12-13) abstract; figures 8-13 | 1-22 |
| X | US 2002/021445 A1 (BOZHEVOLNYI SERGEY ET AL) 21 February 2002 (2002-02-21) figure 2 ----- -/-- | 1-22 |

☒ Further documents are listed in the continuation of box C.☒ Patent family members are listed in annex.

* Special categories of cited documents:

- *A* document defining the general state of the art which is not considered to be of particular relevance
- *E* earlier document but published on or after the international filing date
- *L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- *O* document referring to an oral disclosure, use, exhibition or other means
- *P* document published prior to the international filing date but later than the priority date claimed

T later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

X document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

Y document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

& document member of the same patent family

Date of the actual completion of the international search

10 January 2005

Date of mailing of the international search report

24/01/2005

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
Fax: (+31-70) 340-3016

Authorized officer

Mason, W

INTERNATIONAL SEARCH REPORT

PCT/JP2004/009239

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

| Category * | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|------------|---|-----------------------|
| A | CHANG S ET AL: "Design and fabrication of array format SPR chips in microstructure monolayers detection" 2ND ANNUAL INTERNATIONAL IEEE-EMBS SPECIAL TOPIC CONFERENCE ON MICROTCHNOLOGIES IN MEDICINE AND BIOLOGY. PROCEEDINGS (CAT. NO.02EX578) IEEE PISCATAWAY, NJ, USA, 2 May 2002 (2002-05-02), pages 386-389, XP002310623 ISBN: 0-7803-7480-0 figure 3 | 1-22 |
| X | US 2001/031503 A1 (CHALLENGER WILLIAM A ET AL) 18 October 2001 (2001-10-18) figure 3 | 1-22 |
| X | US 5 442 448 A (KNOLL WOLFGANG) 15 August 1995 (1995-08-15) figure 3 | 1-22 |
| A | EP 0 341 928 A (AMERSHAM INT PLC) 15 November 1989 (1989-11-15) figures 5,6 | 1-22 |
| A | US 2003/048452 A1 (JOHANSEN KNUT) 13 March 2003 (2003-03-13) figure 2 | 1-22 |
| A | US 5 973 316 A (GHAEMI HADI F ET AL) 26 October 1999 (1999-10-26) figure 1 | 1-22 |
| A | WO 03/042748 A (LIENAU CHRISTOPH ; MALYARCHUCK VICTOR (DE); MAX BORN INST FUT NICHTLIN) 22 May 2003 (2003-05-22) figures 1,2 | 1-22 |
| A | VEISEH MANDANA ET AL: "Highly selective protein patterning on gold-silicon substrates for biosensor applications" LANGMUIR; LANGMUIR AUG 20 2002, vol. 18, no. 17, 20 August 2002 (2002-08-20), pages 6671-6678, XP002310624 pages 6671-667, column 8 | 1-22 |

INTERNATIONAL SEARCH REPORT

Information on patent family members

PCT/JP2004/009239

| Patent document cited in search report | Publication date | Patent family member(s) | Publication date |
|---|---------------------|--|--|
| JP 2002357543 A | 13-12-2002 | NONE | |
| US 2002021445 A1 | 21-02-2002 | AT 284543 T AU 8174301 A CN 1468385 T WO 0208810 A2 EP 1305659 A2 JP 2004505294 T | 15-12-2004 05-02-2002 14-01-2004 31-01-2002 02-05-2003 19-02-2004 |
| US 2001031503 A1 | 18-10-2001 | US 6277653 B1 US 5994150 A DE 69818092 D1 DE 69818092 T2 EP 1034423 A1 JP 2001523819 T WO 9926059 A1 | 21-08-2001 30-11-1999 16-10-2003 24-06-2004 13-09-2000 27-11-2001 27-05-1999 |
| US 5442448 A | 15-08-1995 | DE 4310025 A1 AT 219243 T DE 59410136 D1 EP 0618441 A2 ES 2176211 T3 JP 2084421 C JP 6300530 A JP 7117381 B | 29-09-1994 15-06-2002 18-07-2002 05-10-1994 01-12-2002 23-08-1996 28-10-1994 18-12-1995 |
| EP 0341928 A | 15-11-1989 | AT 91548 T AU 611291 B2 AU 3460989 A CA 1335539 C DE 68907519 D1 DE 68907519 T2 EP 0341927 A1 EP 0341928 A1 FI 892225 A ,B, JP 2103469 A JP 2833778 B2 JP 2017431 A US 5035863 A US 5064619 A ZA 8903438 A ZA 8903395 A | 15-07-1993 06-06-1991 16-11-1989 16-05-1995 19-08-1993 21-10-1993 15-11-1989 15-11-1989 11-11-1989 16-04-1990 09-12-1998 22-01-1990 30-07-1991 12-11-1991 31-01-1990 31-01-1990 |
| US 2003048452 A1 | 13-03-2003 | AU 4292701 A EP 1287336 A1 JP 2004500571 T WO 0169209 A1 | 24-09-2001 05-03-2003 08-01-2004 20-09-2001 |
| US 5973316 A | 26-10-1999 | JP 3008931 B2 JP 11072607 A US 6052238 A | 14-02-2000 16-03-1999 18-04-2000 |
| WO 03042748 A | 22-05-2003 | WO 03042748 A1 DE 20122177 U1 | 22-05-2003 21-10-2004 |